# PROGRAMMABLE NOISE GENERATING INSTRUMENT

# U F X 7 1 0 8

## OPERATING MANUAL

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# I. GENERAL INFORMATION

## 1-1 SPECIAL INSTRUCTIONS

### SELECTION OF LINE VOLTAGE AND FUSES

1. Remove Power Cord.
2. Open access door to power entry module with a small screwdriver.
3. Pull fuse carrier out. Replace fuse with required one. (Fuse size marked on rear panel).
4. Pull voltage select wheel out and rotate until correct voltage appears in the window when access door is closed. (DO NOT attempt to rotate wheel in place.)
5. Replace fuse carrier into right hand side slot (this is the only active side) with the white arrow facing to the right. Close access door.

THIS INSTRUMENT IS SUPPLIED WITH A FUSE FOR THE VOLTAGE SELECTED

ALL SIGNAL AND CONTROL CABLES CONNECTED SHOULD NOT EXCEED 3 Meters (9 Feet) IN LENGTH.

## 1-2 INTRODUCTION

This manual is the operation and maintenance manual for Series UFX7000 & UFX9000 series Programmable Noise Generating Instruments. It provides general information plus installation and operation instructions.

Section I provides a description and option information for the Programmable Noise Generating Instruments.

## 1-3 DESCRIPTION OF THE BASIC UNIT

Noise Com, Inc. Series UFX7000 and UFX9000 Noise Generating Instruments represent the state of the art in noise generators. Utilizing dedicated keys and a 4x20 LCD display the UFX series is both user friendly and powerful. They can be controlled manually by means of front panel controls, or, alternately, they can be controlled remotely by means of a controller via IEEE 488 (GPIB) BUS (RS-232, RS-422 or RS-423 option available). These Instruments operate remotely only in the listen mode.

The case is 17" wide, 5.25" high and 12.5" deep. It is equipped with front panel handles and fold down feet. Rack mounting brackets for 19" rack mounting are available. Brackets are mounted at the factory.

The RF circuit, without options, contains a noise generator assembly, a standby switch, and a programmable attenuator (Fig. #1). The above circuit with all options listed in the following section (1-3) is depicted in Figure #2. The digital interface for this unit, without options, is IEEE 488 BUS (GPIB).

## 1-4 OPTIONS AND OPTIONAL CONFIGURATIONS

Programmable Noise Generating Instrument options include:

1. Fine resolution attenuator .1db steps 0 - 127.9DB.

2. Input Power 230V 50Hz.

3. Rack Mounting Brackets (19" x 5¼").

4. Switching bandwidth by means of band limiting filters. Frequencies to be specified by customer.

   4.1 Up to 6 filters and a filter bypass for full band operation.

   4.2 7 Filters.

5. Input connector and resistive combiner. This allows a signal, externally supplied, to be combined with the noise output. Noise output will be 6 dB below standard output specified.

6. The following items may be added to Item 5: Option Items 1, 4 and a 127 dB, 1 dB step attenuator. All of the preceeding items are programmable. These option items will be located in the input connector arm of the RF circuit.

7. The marker input option permits injection of a signal into the output line. The marker input is decoupled approximately 23 dB. Decoupled noise output is available at the marker input.

8. Noise Power Meter option provides the user with a real time measurement of the output noise power.

# II. SPECIFICATIONS

## 2-1 INSTRUMENT SPECIFICATIONS

| | |
|---|---|
| Frequency Range | : 100 Hz - 500 MHz |
| Output Power (before combiner) | : 10 mW |
| Output Power (after combiner) | : 2.5 mW (6 dB loss) |
| Nominal Impedance | : 50 Ohms |
| Output Connectors (Qty. 2) | : BNC (F) |
| Input Connector | : BNC (F) |
| Flatness | : +/- 1.0 dB |
| Storage Temperature | : -20 to +85 Degrees C |
| Operating Temperature | : -10 to +60 Degrees C |
| Relative Humidity | : 95 percent |
| Total Noise Attenuation | : 127.9 dB in 0.1 dB steps |
| Total Signal Attenuation | : 127 dB in 1.0 dB steps |
| Power Requirements | : 120 VAC |
| Interface | : IEEE-488 |
| Re-Calibration Period | : 1 Year |

Noise output is white gaussian noise with a qualified peak factor.

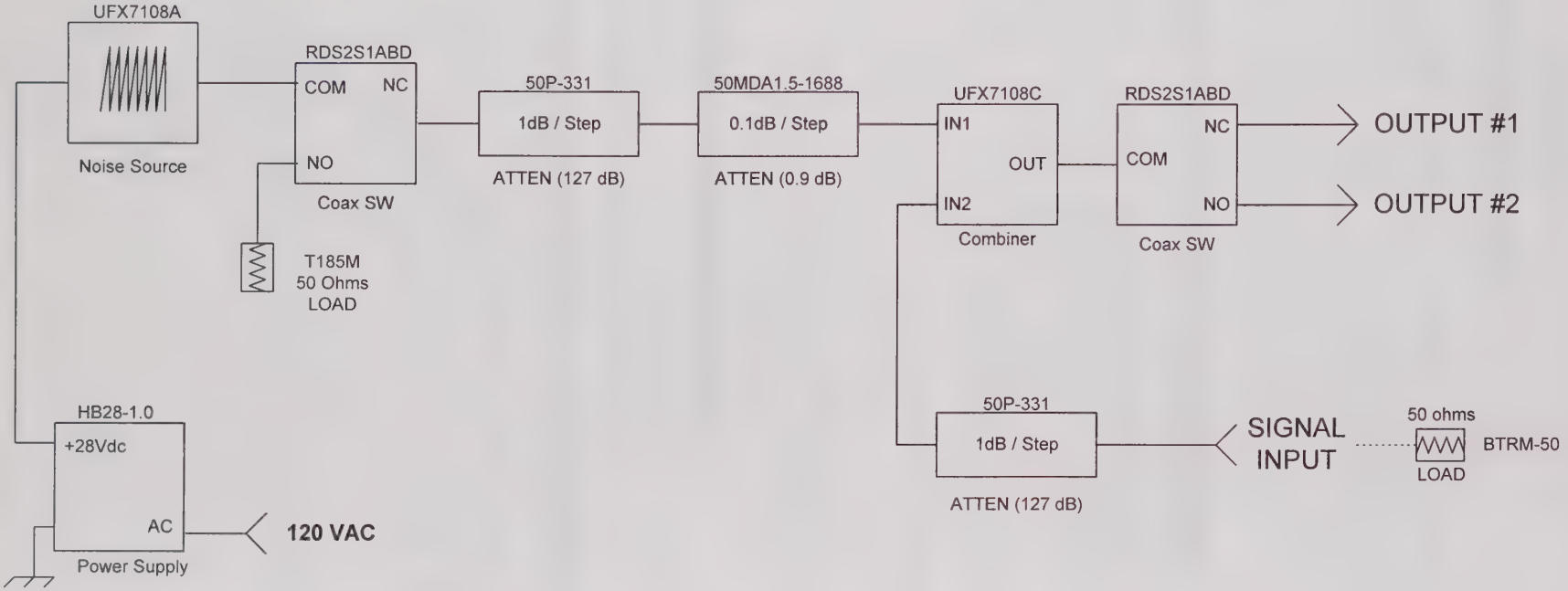
Control by means of front panel or remotely by means of a controller via IEEE (GPIB), RS-232, RS-422 or RS-423.

## 2-2 FUNCTIONAL SPECIFICATIONS

Non Volatile memory to retain program parameters, GPIB address, serial baud rate and user programmed control sequences

| | |
|---|---|
| Baud Rate : | 0150,300,0600,1200,2400,4800 and 9600 to be used with optional serial interface ports ( 8 data bits,no parity 1 stop bit). |
| Time Delay: | 0.1 to 999.9 seconds with 0.1 second resolution. |
| Programmable Attenuator: | Standard 0-127 dB in 1 dB steps. |
| Programmable Attenuator: | Optional 127.9 dB in 0.1 dB steps. |
| Bandwidth selection: | Optional band switching filter to customer specification. Consult Noise Com. |
| Standby Position: | Power is switched into a dummy load. |
| Reset: | A logic reset button is provided. |
| Second Output: | Optional SPDT Switch to connect either of two outputs. |

# Block Diagram - UFX7108



# III. INSTALLATION

## 3-1 INITIAL INSPECTION

Inspect the shipping container for damage. If the container is damaged, retain until the contents of the shipment have been checked against the packing list and the instrument has been checked for mechanical and electrical operation.

If the instrument has been damaged in transit, notify the carrier as well as Noise Com, Inc.

## 3-2 GPIB (IEEE 488 BUS Interconnection)

The only interconnection required for GPIB operation is between the Programmable Noise Generating Instrument and the controller. This is accomplished by means of a standard GPIB 24 wire interface cable.

Restrictions on use of GPIB interconnections are as follows:

1. No more than 15 Instruments may be installed on the bus.

2. Total accumulative cable length in meters may not exceed two times the number of bus instruments, or, 20 meters, whichever is less.

## 3-3 GPIB (IEEE 488 BUS) ADDRESS

The programmable noise generating instrument as shipped from the factory is preset to address 5.

## 3-4 RS-232, RS-422, RS-423 INTERCONNECTION (optional)

RS-232, interconnections are made by means of a DB25S connector mounted on the rear panel. It is wired as DTE. Pin 3 is Receive, Pin 7 is Ground and Pins 4, 5 (RTS-CSD) and Pins 6, 8, 20 (DSR, DCD, DTR) are jumper connected.

Interconnections for RS-422 and RS-423 are made as follows: Use Pin 12 for positive data connection and in 13 for negative data connection.

# IV. OPERATION

## 4-1 INTRODUCTION

The NOISE/COM PNGI uses a powerful single-chip microprocessor to accurately control the amplitude, bandwidth, and combining of its internal broad-band noise source and an externally applied user generated signal.

Commands to the PNGI can be entered via a front-panel dedicated keypad. Alternately, commands can be down loaded from any computer using the GPIB (HP-IB) IEEE-488 instrumentation bus (as a talker), or by the optional RS-232, RS-422, or RS-423 adapters allowing connection to any asynchronous serial interface. A front panel alphanumeric display and lighting status indicators give the operator visual verification of the programming process and functional state of the device.

The PNGI includes a special non-volatile memory which will retain various programmed parameters after the unit has been powered-off, and restore them to the state they were in when the instrument was last used. These preserved functions include GPIB listener address and user programmed control sequences specifying attenuation levels, signal bandwidth, time delays and incremental attenuation step values.

A "Reset" button has been provided. Use of this button will return the instrument to the power turn on state. At power turn on, the programmable attenuator is at 127 dB and standby is off.

When the instrument is powered up the LCD display will show the following for several seconds:

NOISE COM, INC
PROGRAMMABLE NOISE
GENERATOR III
TYPE 2

The type code refers to the status of various factory installed options.

After a brief delay, the MAIN INFORMATION DISPLAY will appear, similar to the display shown below:

```
      MANUAL MODE
NA=127.9dB   NF=1
SA=127.9dB   SF=1
ST=000.1 P=000.0dB
```

MANUAL MODE, on the top line, indicates that the PNG is ready to accept commands from the KEYPAD and has received no commands from a Remote Interface (GPIB, RS-232, RS-485). If the most recent command to the PNG were received from a Remote Interface, rather than the Keypad, the top line would indicate 'REMOTE MODE' to advise the user that the PNG has most recently been under Remote Control, and that a Keypad action (if not disabled by a remotely issued Local Lockout Command) may interrupt a remotely controlled operation.

If the basic unit was ordered without options then the display would indicate the noise attenuation of 127 dB (unless a >2 GHz unit then 79 dB is the maximum attenuation) and the noise filter at position 1.

The internal Noise Attenuator, 'NA', and Signal Attenuator (for an externally applied signal), 'SA' are each set to the maximum attenuation permitted by the PNG Type. The internal Noise Filter, 'NF', and Signal Filter, 'SF', are set to position #1. Position #1 is a through path full (bandwidth). The Step Size, 'ST', is set to the minimum increment permitted by the PNG Type. If the PNG has been internally configured to support a Power Meter, the Noise Power delivered to the load will be displayed in this position.

## INITIAL PNG CONFIGURATION

The first time the PNG is used, and whenever the Remote Communications requirements change, the 'LOCAL' Function should be selected from the Keypad. By pressing this key as the first in a sequence (key interpretations are sequence dependent), the following information screen will be displayed:

```
   KEYBOARD SETUP
GPIB/BAUD     :0005
NEW SETTING   :0000
```

The above display indicates that the PNG is set for remote control via the GPIB (IEEE-488) interface, and that its GPIB address is 5. The 'bar' underlining the New Setting '0000' is a cursor, inviting the user to alter this parameter. A new value may be entered from the keyboard, followed by 'ENTER'. If only the 'ENTER'
key is pressed, without entering any new digits, the original value will not be changed. When the 'ENTER' key is pressed, the New Setting will be 'burned' into non-volatile memory, replacing the previous value. The MAIN INFORMATION DISPLAY will re-appear.

Permissible values for the GPIB/BAUD parameter are '0000' through '0031', which represent GPIB addresses, and the discrete values '0150', '0300', '0600', '1200', '2400', '4800', and '9600', which represent Baud Rates for the optional RS- 232/485 Asynchronous Serial Interface. Selecting a valid GPIB address will simultaneously enable the Serial interface at 9600 Baud. The Serial ASCII character configuration is 8-Data Bits, NO-Parity, 1-Stop Bit. Lower case characters are internally converted to upper case by the PNG. The PNG will acknowledge each Remote Command received by sending a Carriage Return (CR = 0D-hex or 13-decimal) character to the Serial Port.

## 4-2 FRONT PANEL CONTROLS

Programming via the keypad:

The PNGI can be directly programmed through the front panel keypad (see Figure 3) using simple data entry sequences.
Internally the PNGI may have a maximum rf curcuit as follows: two identical attenuation, filtering and standby circuits for the internally generated noise source and for an externally applied signal provided by the user. These three functions can be independently programmed for each of the two signals (see Circuit block diagram Fig 2). The two circuits then combine to a single output.
Functions NOISE ATTEN and NOISE FILTER control the attenuation and bandwidth of the noise source component of the output. Functions SIGNAL ATTEN and SIGNAL FILTER control those same functions as applied to the externaly introduced signal (if this option was ordered). Programming details follow.

### SETTING ATTENUATOR AND FILTER VALUES

To set the PNG's Attenuators and/or Filters to desired values, press the first column key which corresponds to the parameter to be changed. An Information Display similar to one the samples below will be appear:

| KEYBOARD SETUP |
|---|
| NOISE ATTEN =127.0dB |
| NEW SETTING =000.0dB |

| KEYBOARD SETUP |
|---|
| NOISE FILTER = 1 |
| NEW SETTING = 0 |

The 'bar' underlining the New Setting '000.0' or '0' is a cursor, inviting the user to alter this parameter. A new value may be entered from the keyboard, followed by 'ENTER'. If only the 'ENTER' key is pressed, without entering any new digits, the original value will not be changed. When the 'ENTER' key is pressed, the New Command will be executed, setting the hardware appropriately. The new value will be shown in the MAIN INFORMATION DISPLAY.
If the high resolution option was ordered then the noise attenuator would display 127.9 dB instead. If the signal side option was ordered then the signal atten key will fuction when actualized. In either case maximum power is obtained at the output when 0 dB of attenuation is keyed in and as the attenuation level is increased the output noise or signal decreases.

As digits are pressed at the keypad, they enter the parameter display from the right and displace previously entered digits to the left. The parameter display may be reset to zero ('0000' or '0') by pressing the 'CLEAR' key.

Invalid entries will not be accepted. The PNG will automatically limit the Attenuation Value from '000.0' to the maximum value permitted by the PNGI Type (typically 127 or'127.9' or '079.9'). Valid Filter settings range from '1' to '8', inclusive.

Filter setting 1 represents full bandwidth ie a through path. Filter setting 2 terminates the noise into a load internally, ie this is a standby state. These are the only valid settings unless the unit has been configured with the filter option. In this case Filter settings 3-8 represent either internal filters ordered by the customer or back panel connections enabling the customer to connect his own external filters. In this case the first filter is actualized with filter setting 3, the second filter is setting 4, etc.

INCREMENTING / DECREMENTING ATTENUATORS

The Noise and Signal Attenuators may be incremented or decremented by the programmed STEP size using only two key strokes. To use this feature, first set the Step Size to the appropriate value. Pressing the 'STEP' key will cause the following Information Display to appear:

```
KEYBOARD SETUP
ATTEN STEP =000.1dB
NEW SETTING=000.0dB
```

The numeric and 'ENTER' keys are used, in the same manner as for setting Attenuators, to set the Step Size. The selected value will be added to or subtracted from the selected Attenuator when the INC and DEC Function Keys are used first in a sequence.

To execute this function, press either the 'INC' or 'DEC' key, as appropriate, followed by the 'NOISE ATTEN' or 'SIGNAL ATTEN' key. The new Attenuator setting will be reflected in the MAIN INFORMATION DISPLAY, and a Cursor Bar will call attention to the most recent change.

Invalid entries will not be executed. The PNG will automatically limit the Attenuation Value from '000.0' to themaximum value permitted by the PNG Type (typically '127.9' or '079.9').

## PROGRAMMING NOISE FUNCTION SEQUENCES

Through the Keypad, the PNG-III can be programmed with operational sequences to be executed at a future time, and which can be repeated as many times as necessary without re-keying the commands. The PNG-III is capable of storing, in non-volatile memory, ten (10) separate programs. The concepts associated with

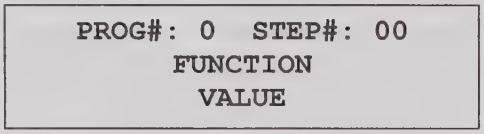
Program use are described below.

A PROGRAM is a sequence of instructions which can be stored in memory and called for execution when needed. The size of a program (the number of instructions it may contain) is limited by the amount of memory available for storage. Programs in the PNG-III are organized like snippets of movie film, each having up to sixteen (16) frames. As in a movie, each FRAME can describe a different
piece of the action. FRAMES played in sequence show changes in action, and Snippets of film spliced together can represent longer action sequences.

To enter PROGRAM EDIT MODE, press 'PROG' on the Keypad.

PROG#0

FRAMES in a PNG PROGRAM appear thus:



The number shown after 'PROG#:' defines the current PROGRAM Number (Film snippet number) being edited. Valid PROGRAM numbers are '0' through '9'. The number shown after 'STEP#:' defines the FRAME Number being edited within the current PROGRAM. Valid FRAME Numbers are '00' through '15'.

In place of the word 'FUNCTION' will be displayed the name of the PNG component being controlled by the frame (such as 'NOISE_AT', 'SIG._AT', 'NOISE_FR', 'SIG._FR', 'SEL._AT', 'NOISE_ST' or 'SIG._ST'), or a Program Flow Command (such as 'DELAY', 'GOTO' or 'EXIT').

In place of the word 'VALUE' will be displayed the numeric value being assigned to the PNG component or Program Flow Command or the words 'INC.' or 'DEC.'

For each of the four parameters in the frame, the user may choose to accept the current Program Step by keying 'ENTER', or key in an alternate Command of appropriate composition. Once the first edited frame is completed, the next sequential frame will appear for editing. THE LAST FRAME IN A PROGRAMMED SEQUENCE MUST HAVE THE 'EXIT' COMMAND. The 'EXIT' Command will be saved in the PNG's non- volatile memory and terminate the Program Editing Session. The session may be terminated prematurely by pressing the 'RESET' button,
however the currently displayed frame, if altered, will not be posted to non-volatile memory.

Two new functions, available only in Program Edit Mode and Remote Command Mode, are 'DELAY' and 'GOTO'. The DELAY function causes the execution of a Time Delay of from '000.0' to '999.9' Seconds in the program sequence. The GOTO Command causes a branch to a frame number out of sequence, but within the same program.

The 'INC' and 'DEC' functions can also be used within a programmed sequence. To use these functions, press either 'INC' or 'DEC' when the Cursor Bar indicates the 'FUNCTION' part of the command. The Program Edit Display will appear like this:

```
PROG#:1      STEP#:09
SEL. AT
                    INC.
```

The cursor will point to the 'SEL. AT' field, indicating that the appropriate Attenuator, 'NOISE ATTEN' or 'SIG.ATTEN' must be selected. Upon pressing the appropriate key, the Program Edit Display will show:

```
PROG#:1      STEP#:09
NOISE AT
                    INC.
```

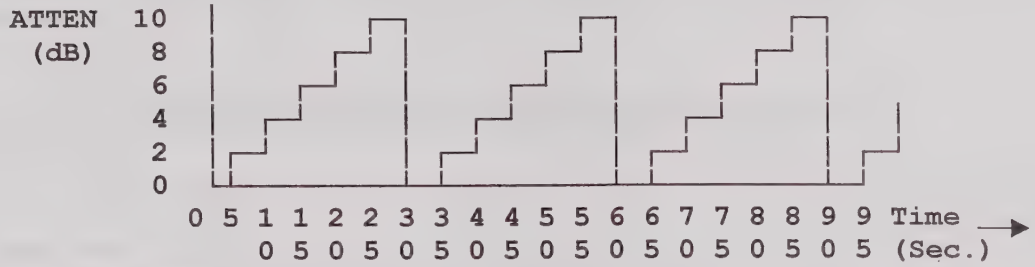
At this time, the user may press 'ENTER' to accept the command, or a numeric key which will change the command to assign a numeric value to the selected attenuator.

Consider the following Program requirements:

The Noise Attenuator is to be incremented from 000.0 to 010.0dB in steps of 002.0dB with the Noise Filter set at '2'. At each attenuator setting, the state is to be held for 5-seconds before advancing to the next. This sequence is to be repeated indefinitely. The required programming steps are as follows:

| PRG# | STP# | KEYSTROKES | COMMENTS |
|---|---|---|---|
| 0 | 00 | [ENT] [ENT] | PRG#0 STP#00 |
| | | [STEP] [0] [0] [2] [0] [ENT] | SET NS=002.0 |
| 0 | 01 | [NOISE FILT] [2] [ENT] | SET NF=2 |
| 0 | 02 | [NA] [0] [0] [0] [0] [ENT] | SET NA=0.000 |
| 0 | 03 | [DELY] [0] [0] [0] [5] [0] [ENT] | DELAY 5.0 SEC. |
| 0 | 04 | [INC] [NOISE ATTEN] [ENT] | NA=NA+NS =2.0 |
| 0 | 05 | [DELY] [0] [0] [0] [5] [0] [ENT] | DELAY 5.0 SEC. |
| 0 | 06 | [INC] [NOISE ATTEN] [ENT] | NA=NA+NS =4.0 |
| 0 | 07 | [DELY] [0] [0] [0] [5] [0] [ENT] | DELAY 5.0 SEC. |
| 0 | 08 | [INC] [NOISE ATTEN] [ENT] | NA=NA+NS =6.0 |
| 0 | 09 | [DELY] [0] [0] [0] [5] [0] [ENT] | DELAY 5.0 SEC. |
| 0 | 10 | [INC] [NOISE ATTEN] [ENT] | NA=NA+NS =8.0 |
| 0 | 11 | [DELY] [0] [0] [0] [5] [0] [ENT] | DELAY 5.0 SEC. |
| 0 | 12 | [INC] [NOISE ATTEN] [ENT] | NA=NA+NS =10.0 |
| 0 | 13 | [DELY] [0] [0] [0] [5] [0] [ENT] | DELAY 5.0 SEC. |
| 0 | 14 | [GOTO] [0] [2] [ENT] | LOOP TO STEP#02 |
| 0 | 15 | [EXIT] [ENT] [ENT] | PROGRAM END |

A graph of the Noise Attenuation resulting from the above program would appear as follows:




For those programmers wishing to write and use programs longer than 16 steps, it is possible to take advantage of contiguous program memory within the PNG. As there is space for ten programs of 16 steps each, a program starting at PRG#0 STP#00 could take advantage of the complete 160 step program space. In the absence of an 'EXIT' command instruction, the program will continue from PRG#0 STP#15 to PRG#1 STP#00. By similar planning, a program starting at PRG#1 could contain up to 16 X 9 = 144 program steps. Of course, writing programs longer than 16 steps makes the used program space unusable for programs that would normally fit into the over-flow space. Bear in mind, too, that the GOTO command can only branch within the true space of the current program, and that the programming 'language' does not yet support conditional branch instructions.

## EXECUTING A STORED PROGRAM SEQUENCE

To execute a previously stored program sequence, press the 'EXEC' key on the PNG's Keypad. The following Information Display will appear:

| EXECUTE<br>STORED PROGRAM<br>#0 |
|---|

Enter the number of the program to be executed, followed by the 'ENTER' key. The selected program will be executed, beginning with the first frame of the sequence. As the steps of the program are executed, Information Displays of the following format will appear:

| PROGRAM<br>EXECUTING<br>PROG#0<br>FRAME#03 |
|---|

As the above display will only be visible during execution of each Program Step, only DELAY steps will appear for a duration sufficient for viewing.

## 4-3 REMOTE CONTROL OF THE PROGRAMMABLE NOISE GENERATOR

All of the PNG Functions Programmable via the Front Panel Keypad (with the exception of LOCAL) may also be controlled through a remote Computer, Terminal, or Automatic Test Equipment (ATE) using the GPIB or Asynchronous Interface Option Ports.

A 'language' has been developed for communicating with the PNG, using simple ASCII character string Commands terminated by a CR (Carriage Return) and optional LF (Line Feed). Space characters may be inserted for clarity of reading, or may be deleted to improve message throughput. When using the GPIB interface, the message may be terminated by a LF, by the EOI hardware handshake line, or both.

The PNG, when powered on, is ready to accept commands and data from a controlling device and respond with acceptance handshaking when required.

Commands may be entered individually (1 command per line), or in groups(several commands per line), with a maximum of 64 characters (including CR/LF) per line. Commands not having proper syntax or excessive length will be ignored. It is the user's responsibility to insure that only valid and proper values are entered for selected parameters.

Most Commands begin with a 2-character prefix, the first character being 'N' or 'X' to indicate whether the Noise or external signal channel of the PNG-III will be effected ['X' is used, rather than 'S' to avoid confusion with the Step Commands]. The second character (A,F,S, or T) indicates whether the Command controls Attenuation, Filters, Step Size or Time Delay (TD is also an acceptable format for specifying a Time Delay). The following characters, which may be 'I', 'D' or numbers indicate Increment, Decrement or value assignment functions.

Numeric values for Attenuation, Step Size and Time parameters may be entered in a 'free-format', and may include a decimal point where appropriate. Thus, 012.5, 12.5 and 0125 are equivalent, as are 012.0, 12.0, 12 and 0120. Numeric values for Filter setting MUST be entered as a 4-digit integer, with the most-significant three digits being zero, and having a range from '0001' (Dummy Load on) through '0008'. Alternately the Filter setting may be specified as a decimal point '.' followed by a single digit. Thus, '0003', '0.3' and '.3' are acceptable and equivalent; '3' alone is not acceptable. The destination Step Number of a GOTO instruction, used in Program Entry Mode, must also be entered as a 4-digit number, with the most significant two digits being zero and having a range from '0000' through '0015'.

When a Remote Command that directly addresses the Attenuators or Filters is executed (NA, NF, XA, XF), the MAIN INFORMATION DISPLAY will show the change to the most recently effected channel (Noise or external).

COMMANDS:

| | |
|---|---|
| NAnnnn or NAnnn.n | Sets the Noise Attenuator to nnn.n dB. |
| NSnnnn or NSnnn.n | Sets the Noise Step size to nnn.n dB. |
| NF000n or NF.n | Sets the Noise Filter to position 'n'. |
| NAI | Increments the Noise Attenuator by the Noise Step size. |
| NAD | Decrements the Noise Attenuator by the Noise Step size. |
| XAnnnn or XAnnn.n | Sets the external Signal Attenuator to nnn.n dB. |
| XSnnnn or XSnnn.n | Sets the eXternal Attenuator Step size to nnn.n dB. |
| XF000n or XF.n | Sets the external Filter to pos'n 'n'. |
| XAI | Increments the external Attenuator by the external Step size. |
| XAD | Decrements the eXternal Attenuator by the eXternal Step size. |
| TDnnnn or TDnnn.n | Specifies a Time Delay (in seconds). |
| Pn | Causes execution of stored Program #n. |

| | |
|---|---|
| Pn:mm NA12 | Enters PROG#n FRAME#m into non-Volatile memory. The specific Command may be any that are Permissible for Keypad entry of Program Steps, plus the ability to specify a Step Size for the Signal Attenuator differs from That of the Noise Attenuator Step. |
| T0nnnn or T0nnn.n<br>T1nnnn or T1nnn.n | Specifies the start of a TRIGGER sequence. |
| Q | Requests PNG Status report to the GPIB Port. and Async. Port. If the Async baud Rate is not Set-up, Default is 9600. |
| M | Sends Diagnostic Memory Dump to the Async. Port. |

REMOTE CONTROL EXAMPLES:

| | |
|---|---|
| NA0123 cr | Sets the Noise Attenuator to '012.3' |
| NA12.3 NF0007 cr | Sets the Noise Attenuator to '012.3' |
| NA000.0 NS001.0 cr | Sets the Noise Attenuator to '000.0' |
| NAI cr | When following the above, sets the Noise Attenuator to '001.0' db. |
| NAI cr | When following the above, sets the Noise Attenuator to '002.0' db. |
| NAD cr | When following the above, sets the Noise Attenuator back to '001.0' db |
| NA0000 NS0010 TD0010 | NAI TD0010 NAI TD0010 NAD cr Performs the same functions as the Group above, while inserting a 1-Second Time Delay between each Change. |

The following sequence of instructions enters the same sequence of program steps described in the Keypad Programming example above. Note that specific 2- character codes are used to represent Program Functions, and that all such Program Entry Commands must have the same opening format 'Pn:mm '

```
P0:00 NS002.0 cr      P0:08 NAI cr
P0:01 NF0002 cr       P0:09 TD 5 cr
P0:02 NA 0 cr         P0:10 NAI cr
P0:03 TD 5 cr         P0:11 TD 5 cr
P0:04 NAI cr          P0:12 NAI cr
P0:05 TD 5 cr         P0:13 TD 5 cr
P0:06 NAI cr          P0:14 GO 0002 cr
P0:07 TD 5 cr         P0:15 EX
```

Where cr is either a cr character for the RS-232 option or for GPIB interface operation it is a LF or EOI hardware or both.

Valid 2-character Function Codes for PNG-III Programs are:

```
NA := Noise Attenuator
XA := eXternal signal Attenuator
NF := Noise Filter
XF := eXternal signal Filter
NS := Noise Step
XS := eXternal signal Step
TD := Time Delay
GO := GOTO
EX := EXIT
```

Note that it is possible to enter a Signal Step size that is different than the Noise Step size, when programming via a Remote Port. It is important to note that a Noise Step Command, whether entered from the Keypad or a Remote Port, will set both the Noise Step and Signal Step values. An 'XS' Command, entered via a Remote Port, will set only the Signal Step value. Therefore, to enable differing values for the two Step sizes, the Signal Step value must be set AFTER setting the Noise Step value.

TRIGGERING: T d1 [ d2 d3 d4 d5 ]

When operating the PNG under control of a Remote Device, an Execution Trigger may be specified that will cause immediate (default) or deferred execution of the command. The values for d1 and their corresponding effects are tabulated below:

d1 = 0 := Execute Immediately on CR[/LF] (default)

d1 = 1 := Execute upon receipt of a GET Code *

The T0 or T1 code must be the first Command of a multi- byte sequence, and may be optionally followed by 1 to 4 digits representing an initial Time Delay after which the rest of the Command Sequence is to be run. For Example, the command shown below would wait for a GET (Group Execute Trigger) Code as a Trigger. It would then delay 5.5 seconds, after which it would recall and execute previously stored Program Sequence #1.

T1 005.5 P1 CR

A Trigger Command can also specify a sequence of Commands to be executed directly from the Command Line:

T1 5.5 NF0002 NA120.0 XF0004 XA0000 CR

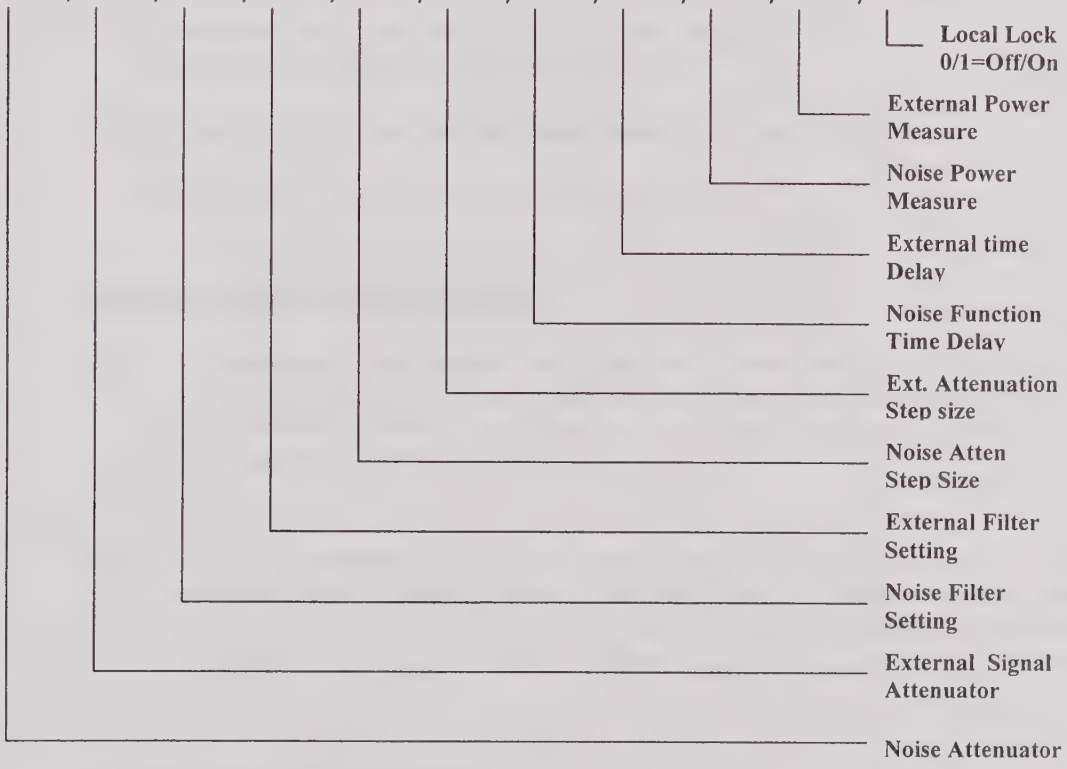
The above Trigger Command would cause the Noise Filter to be set at '2', the Noise Attenuator to be set at '120.0', the eXternal Filter to be set at '4' and the eXternal Attenuator to be set at '000.0'dB. This would occur 5.5 seconds after receipt of an anticipated 'GET' command from the GPIB interface.

When any of the PNG functions are activated as a result of a Remote Command Sequence, the Main Information Display will indicate 'REMOTE MODE' on the top display line. Additionally, the Display will show the EXECUTING message if a remotely executed Program sequence is still executing. This will alert users not to tamper with the front panel keys, as the PNG may be under a current control sequence from an external device. Pressing a Front Panel Key will interrupt any sequence in progress and seize control of the device unless the GPIB LOCAL LOCKOUT COMMAND (LLC) is issued, whereupon only the 'RESET' button is active.

Q: inQuiry

The 'Q' command is issued by the controlling computer or terminal to solicit a Status Report of the current state of the PNG- III. Upon receiving the command, the PNG will respond by transmitting a string of ten (10) 4-digit numbers, each separated by a comma and followed by the single digit '0' or '1' to indicate the status of Local Lock-Out. The line is terminated by a CR/LF sequence. The first ten numbers represent: Noise_Atten, External_Atten, Noise_Filter, External_Filter, Noise_Step, External_Step, Noise_Time_Delay, External_Time_Delay, Noise_Power, External_Power. The presented valued will have validity only for those parameters whose features have been installed in the PNG-III. Typical Format is:

'1270,1270,0001,0001,0010,0010,0000,0000,0000,0000,0crlf'




Note that values for Attenuation, Step and Time parameters are reported without decimal points. It should be recognized that a decimal point is appropriate between the 3rd and 4th digits of these values.

# V. PERFORMANCE VERIFICATION

## 5-1 TEST EQUIPMENT

Spectrum Analyzer, Hewlett Packard 8566B, 8557A, 8558B.

Dynamic Signal Analyzer (FFT) Hewlett Packard 3561A.

Power Meter, Hewlett Packard 432A.

RF Voltmeter Hewlett Packard 3400A.
(True RMS Voltmeter)

Digital Plotter Hewlett Packard 7470A.

Temperature Compensated Thermistor Mount
Hewlett Packard 478A or 8478B.

Attenuator, Weinschel Engineering 4M-10dB.

Computer, Hewlett Packard Model 85B.

## 5-2 FREQUENCY RESPONSE

Frequency response may be verified by placing a 10 dB attenuator on the output of the programmable noise instrument and viewing on a spectrum analyzer of FFT as appropriate.

5-3 Power output may be measured by means of a power meter and thermistor mount for frequencies above 10MHz. Below 10MHz, a true RMS voltmeter such as HP3400A with 50 ohms shunting the input, should be used.

## 5-4 DIGITAL FUNCTIONS

Digital functions may be verified by means of the programming instructions of section 4-3.

# VI. ADJUSTMENT & CALIBRATION

Noise Com, Inc. certifies that its products meet published specifications at the time of shipment from the factory. Noise Com, Inc. further certifies that its calibration measurements are traceable to the United States National Institute of Standards and Technology, to the extent allowed by the institute's calibration facility, and to the calibration facilities of other International Standards Organization members.

Your Noise Generating Instrument should be returned to Noise Com, Inc. periodically for adjustment and calibration.

One year after purchase, and at least once a year thereafter is highly recommended to re-assure your instrument's accuracy.

Favorable 3-years Calibration Service Contracts are available.

For further information,

* * * Call Noise Com, Inc. at (201) 261-8797 * * *

## VII. SERVICE

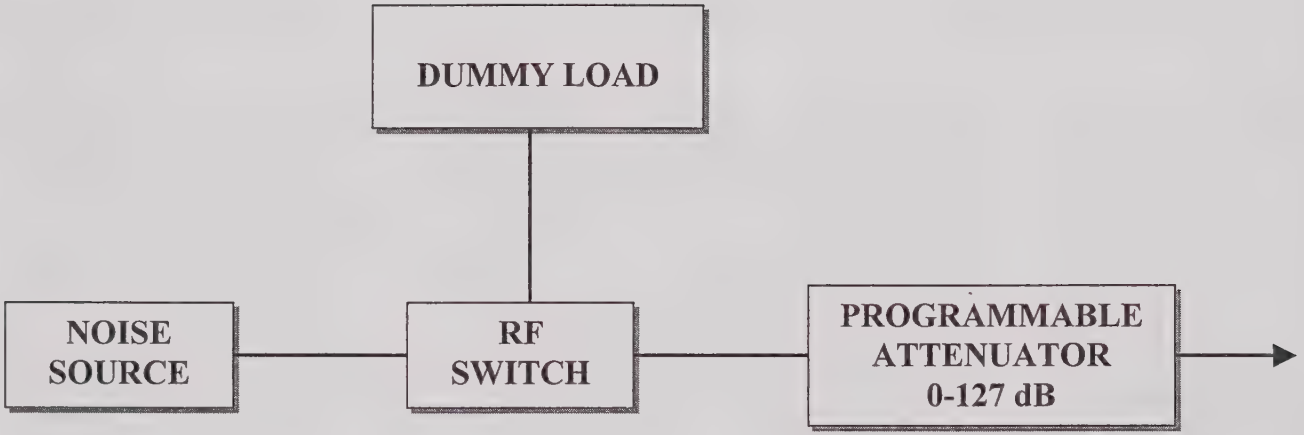
Your Noise Generating Instrument may be returned to Noise Com, Inc. for service. Prior to sending, please call us at (201) 261-8797 for details.

### 7-1 COMMON PARTS

| | |
|---|---|
| GPIB CONNECTOR | IEEE-488-1 |
| FUSE | 1.25 Amp. |
| POWER SUPPLY (28 VOLT) | HB-28-1.0 |
| POWER SUPPLY (5 VOLT) | HB-5-3.0 |
| LINE CORD | 17250 |
| DISPLAY BOARD | UFX A/R |
| PROGRAMMABLE BOARD | UFX A/R |
| SWITCH (ON/OFF) | C10B04649U |
| LCD DISPLAY | 20434 |
| RESET SWITCH | MML21HR2AAR |
| CABINET | R517-12 |
| LOAD #1 | T185M |
| LOAD #2 | BTRM-50 |

## 7-2 PARTS LIST

| | |
|---|---|
| NOISE SOURCE | UFX7108A |
| COAXIAL SWITCH - Qty. 2 | RDS-2S1AB-D |
| ATTENUATOR (1 dB/Step)- Qty. 2 | 50P-331 |
| ATTENUATOR (0.1 dB/Step) | 50MDA-1.5-1688 |
| COMBINER | UFX7108C |
| AC RECEPTACLE / EMI FILTER | 6EDL4 |
| OUTPUT CONNECTORS 1 & 2 | BNC (F) |
| INPUT CONNECTOR | BNC (F) |




BASIC RF CIRCUIT
FIGURE: 1

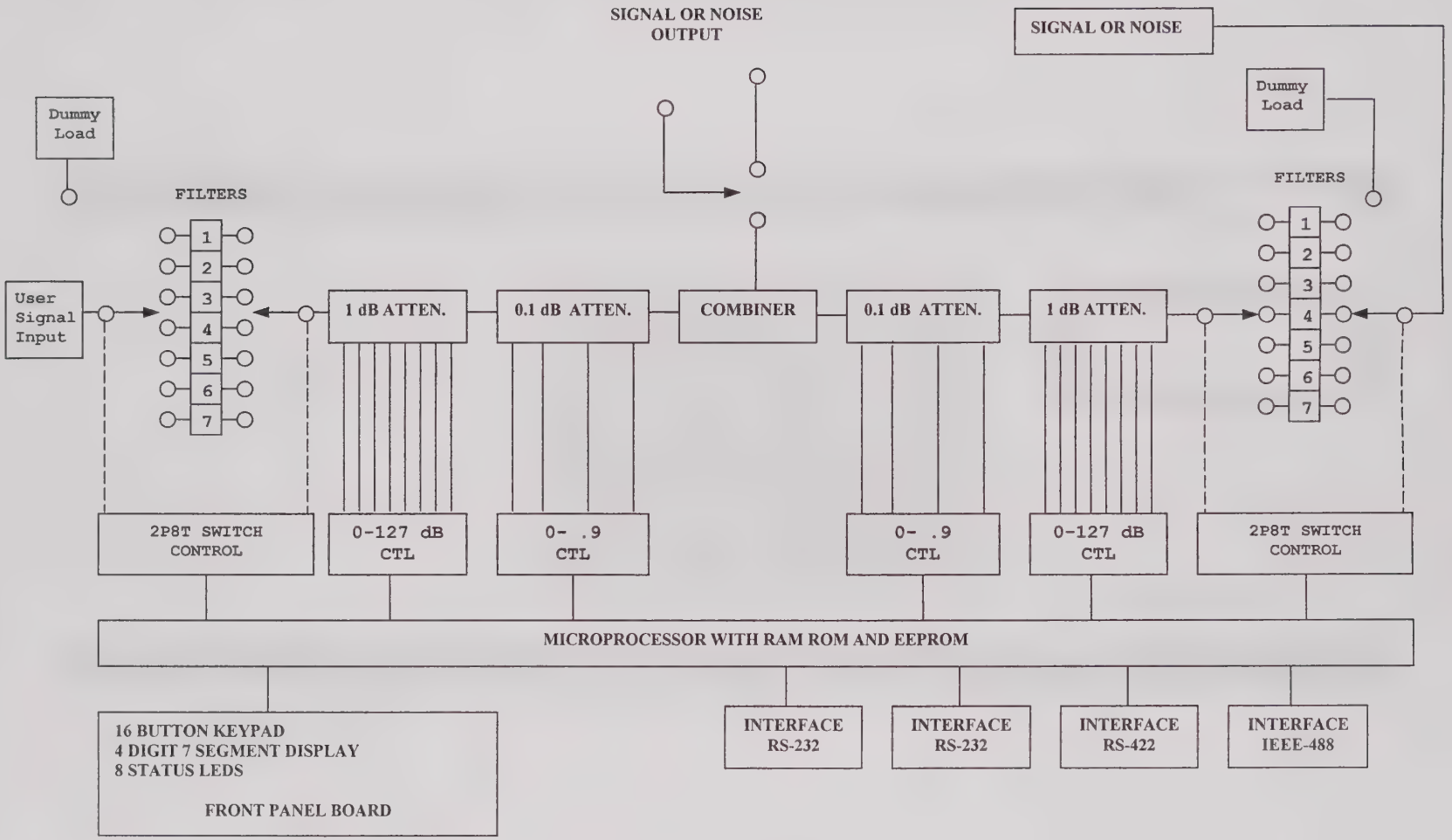
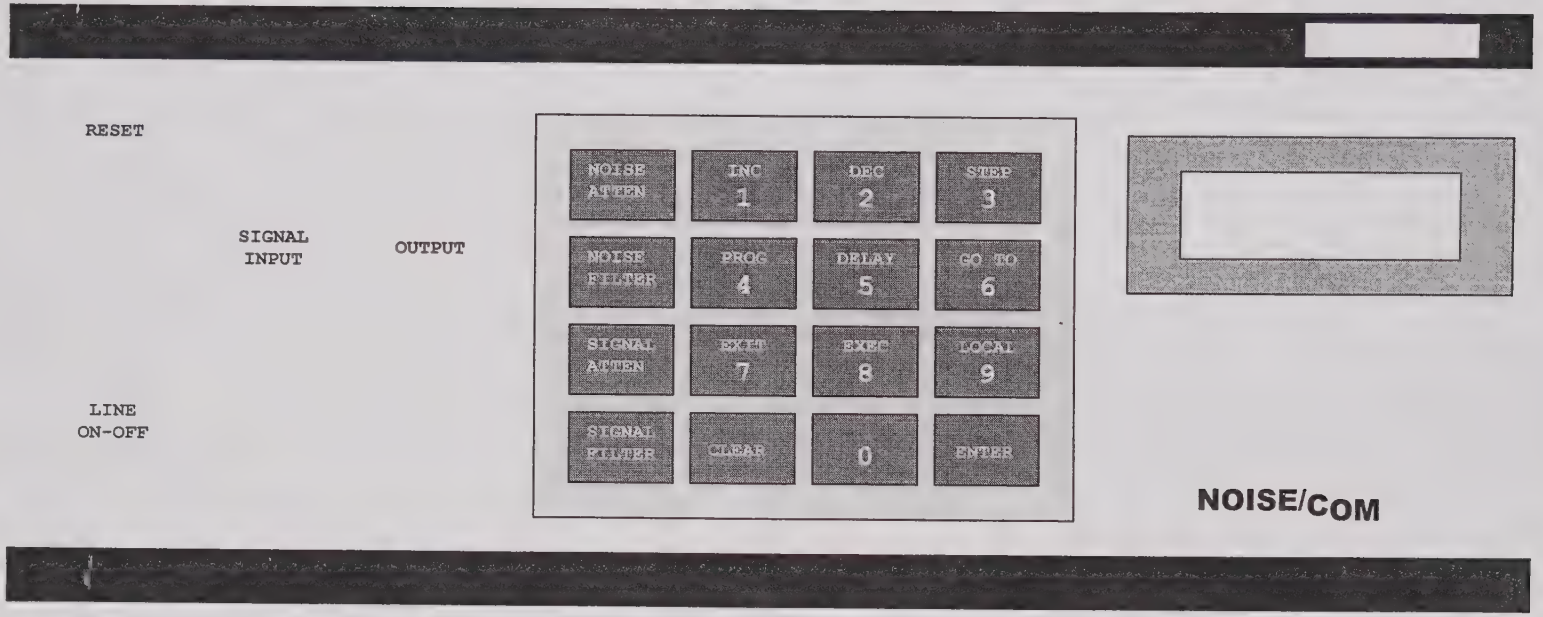

SIGNAL OR NOISE OUTPUT
SIGNAL OR NOISE
Dummy Load
Dummy Load
FILTERS
FILTERS
1
2
3
4
5
6
7
User Signal Input
1 dB ATTEN.
0.1 dB ATTEN.
COMBINER
0.1 dB ATTEN.
1 dB ATTEN.
2P8T SWITCH CONTROL
0-127 dB CTL
0- .9 CTL
0- .9 CTL
0-127 dB CTL
2P8T SWITCH CONTROL
MICROPROCESSOR WITH RAM ROM AND EEPROM
16 BUTTON KEYPAD
4 DIGIT 7 SEGMENT DISPLAY
8 STATUS LEDS
FRONT PANEL BOARD
INTERFACE RS-232
INTERFACE RS-232
INTERFACE RS-422
INTERFACE IEEE-488

FIGURE 2

NOISE COM P/N 13567




LAT DARK GREY

## VIII. WARRANTY

All Noise Com products are warranted against defects in materials and workmanship for a period of one year from the date of shipment. Noise Com, Inc. will, at its option, repair or replace products that prove to be defective during the warranty period, provided they are returned to Noise Com. Repairs necessitated by misuse of the product are not covered by this warranty. NO OTHER WARRANTIES ARE EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. NOISE COM IS NOT LIABLE FOR CONSEQUENTIAL DAMAGES.

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